



PAEDIATRIC ACUTE CARE GUIDELINE

Hyponatraemia

Scope (Staff):	All Emergency Department Clinicians
Scope (Area):	Emergency Department

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Hyponatraemia

Hyponatraemia is defined as serum sodium (Na) $<135\text{mmol/L}$. It results from an excess of water relative to sodium in the extracellular fluid compartment. Symptoms are likely if Na $<125\text{mmol/L}$ or if there has been a rapid fall in the sodium level.

Background

- Hyponatraemia is one of the most common electrolyte disorders encountered in children occurring in approximately 3% of hospitalised children
- Under normal circumstances the human body can maintain Na within the normal range of 135-145 mmol/L
- Hyponatraemia usually occurs in the setting of excess water intake with or without sodium losses, in the presence of impaired free water excretion
- Administration of hypotonic fluids via the intravenous or enteral route is the most common cause of hospital acquired hyponatraemia

General

- Usually the body can prevent hyponatraemia by generating dilute urine in order to excrete free water
- Water excretion is often impaired secondary to increased anti-diuretic hormone (ADH) levels. If this occurs in the absence of osmotic or hypovolaemic stimulus it is termed SIADH. (Syndrome of Inappropriate Diuretic Hormone Secretion).

Causes of Hyponatraemia	
Administration of hypotonic fluids	
- SIADH- Which can be caused by a number of medical conditions including: - Meningitis / Encephalitis - Pneumonia / Bronchiolitis - Surgery - Pain - Nausea / Vomiting	
Water intoxication in infants receiving dilute formula or supplemental water	
- Medications - Diuretics - Desmopressin with associated relative excess fluid intake	
- Rarer causes include: - Adrenal insufficiency (congenital adrenal hyperplasia, Addison's disease) - Defects in renal tubular absorption	

Assessment

- Most children with mild to moderate hyponatraemia will be asymptomatic or have symptoms of their underlying condition
- Rapid changes in sodium levels may cause headache, nausea, vomiting and weakness
- Hydration status and intravascular volume status must be assessed as this will help establish the cause and influence treatment
- If there is evidence of hyponatraemic encephalopathy (seizures, impaired level of consciousness) seek senior advice as urgent treatment is required

History

- A detailed history of fluid intake, fluid losses and current medication must be taken
- In admitted patients intravenous/enteral fluid administration, weight and fluid balance should be reviewed

Examination

Symptoms of severe hyponatraemia include
- Headache - Nausea - Vomiting - Weakness - Impaired level of consciousness - Seizures - Encephalopathy - Respiratory Depression

Investigations

- Investigations should include measurement of plasma osmolality, urinary osmolality and urinary sodium
- Urine osmolality and plasma urea can differentiate the cause of the hyponatraemia
 - Osmolality > 20mmol/L for dehydration, but < 20mmol/L for water intoxication
- Paired plasma and urinary osmolality are needed to diagnose SIADH
- Urinary sodium should also be checked, low urinary sodium suggests intravascular volume depletion

Management

- If there are no neurological manifestations of hyponatraemia correction with hypertonic saline is unnecessary and potentially harmful
- Symptomatic hyponatraemia is a medical emergency. Notify ICU urgently and arrange for senior medical review.

Initial management

Management of Symptomatic Hyponatraemia

- Sodium should be corrected to 125 mmol/L or until seizures stop if this occurs first:
 - Give an infusion of 3ml/kg 3% Saline over 30 minutes
 - Sodium should then be re-measured
 - A further 3ml/kg 3% Saline should be administered if still fitting and Na <125 mmol/L
- Where possible 3% Saline should be given via a central line as it is hypertonic. If a central line is not available do not delay administration; careful use of a peripheral line is appropriate.
- Aim is to correct the serum sodium by no more than 5-6 mmol/L over the first 2 hours
- Fluid restriction alone has no role in the management of symptomatic hyponatraemia
- When symptoms have resolved, aim to correct the hyponatraemia and dehydration over 48 hours. The sodium correction should not exceed 8 mmol/L per 24 hours.
- Measure serum sodium and electrolytes after initial corrections and repeat every 4 hours until stable

- **NOTE:** Active correction with 3% Saline is not necessary and potentially harmful
- Management will depend on volume status:

Management of Asymptomatic Hyponatraemia

- If normal or increased volume status:**
- Fluid restrict to 60% of maintenance fluid
 - Do not give hypotonic fluids
 - Review medications history and treat any stimuli to ADH secretion

If mild-moderate dehydration and Na $\geq$ 130 mmol/L:

- Consider enteral rehydration with oral rehydration solution
- Close monitoring of electrolytes, ongoing losses and fluid losses
- Remember oral rehydration solution is hypotonic and may result in a further fall in Na or failure to correct. If this occurs give 0.9% Saline with 5% glucose if appropriate intravenously.

If severe dehydration or serum sodium <130 mmol/L:

- Administer 0.9% Saline with 5% glucose if appropriate
- Measure serum sodium and electrolytes 4 hours after commencing/altering therapy and repeat every 4 hours until stable

Nursing

- Any hospitalised child is at risk of hyponatraemia whether receiving enteral or intravenous fluids
- Children with hyponatraemia should be monitored closely for altered neurological status and any concerns should prompt a medical review
- Accurate daily weight, fluid intake, fluid output and balance should be recorded in all patients with hyponatraemia
- 0.9% Saline + 5% Glucose should be the intravenous fluid of choice in children at risk of developing hyponatraemia (see ED Guideline: [Fluids – Intravenous Therapy](#)).
- Children with confirmed hyponatraemia should have their electrolytes measured every 4 hours until stable

Tags

cerebral, dehydration, diuretics, electrolyte, encephalopathy, headache, hyponatraemia, intoxication, kidney, na, nausea, oedema, serum, shock, siadh, sodium, water

References

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